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Applying Six-Sigma in Assessing Variation to Reduce Non-Conforming Net-Weights of Bar Soaps in a Local Soap Manufacturing Enterprise

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ABSTRACT

Nonconforming products and the desire to reduce variation in manufactured goods has been a major problem in the manufacturing sector. The aim of this study is to apply six-sigma in assessing variation to reduce non-conforming net-weights of bar soaps in a local soap manufacturing enterprise. The Six Sigma DMAIC (define, measure, analyze, improve, and control) quality improvement methodology was used for this study and a Digital Electronic laboratory weighing balance 5000g/0.1g was used in weighing the various samples to obtain data for study, while Minitab software 20 was used in carry out all the analysis. From analysis, the population mean of the bar-soap net weights was discovered to be within 67.3 and 68.4grams which is below the declared net weight of the product. Critical To Quality Characteristics (CTQs) were identified and improved upon and when deployed in the production process, improved the bar-soap net weights population mean to 71.4 and 71.9grams. To check the final stability of the improved and prevailing net weights, the mean and standard deviation of the improved process was used to run a simulation study and the X-bar – S chart proved that if present conditions are maintained, the manufacturing process will churn out consistent bar-soap net weights of 70+ grams which will leave customers satisfied and also meet the regulatory requirement of NAFDAC. The study concluded that the Six Sigma is disciplined, focused and scientific problem solving technique, which uses statistical and non statistical tools integrated with methodology to bring down number of defects to 0/ 3.4 defects per million opportunities in any process and thus recommended for business and researchers who wish to improve their products and services.

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KEYWORDS: *Six Sigma, product quality, defective product, non-conformity, quality control*

INTRODUCTION

Non-conforming products is a big problem is a production process which decreases the yield of good unit, resulting from product nonconformity with established specification due to manufacturing variability (Djamaludin et al, 1994; Mu et al, 2013; Dambhare et al, 2013). Since the early 1980s, manufacturing industries worldwide have seen a revolution in the way they operate. Consumers have become more and more demanding, and the key to firm survival is the recognition of the importance of customer satisfaction. Consequently, companies have been forced to enhance the quality of both their processes and products (Efstratiadis et al., 2000).

There could be several ways of explaining what really soap is and what can be regarded as soap. We can regard it as any cleaning agent, manufactured in bars, granules, flakes, or liquid form, made from a mixture of mostly sodium or potassium salts of various fatty acids of natural oils and fats. In addition to basic raw materials, other substances of medicinal importance are added as ingredient to produce medicated soaps (Man, 2002; Warra, 2013; Rao et al, 2015). In Nigeria, as required by the National Agency for Food and Drug Administration and Control (NAFDAC), in the interest of the consumers/users of these products, the net weight of the finished product is an important

quality dimension that must be declared on the product pack and adhered to (NAFDAC, 2021).

Six-sigma is a systematic method that has been widely used to reduce variation in processes and to improve the product quality which could be done by using numerous quality improvement and statistical models (Kwat and Anbari, 2002; Lee, 2005; Leea et al, 2009, Kumaravadivel & Natarajan, 2013; Sonphuak & Rojanarowan, 2013). DMAIC (define, measure, analyze, improve and control) is the classic six-sigma problem solving process. The variation found from the customer or company set specifications either in a product or process could be in many forms. DMAIC resolves issues of defects, deviations from a target, excess time or cost and deterioration. DMAIC also identifies the key requirements, deliverables, tasks and standard tool for a project team to utilize when tackling a problem (McClusky, 2002; Majoomdar, 2002; Kairulazam et al, 2013; Nithyanandam et al., 2014; Ketan and Nassir, 2016). The DMAIC methodology, which uses a stepwise structure, and the steps generally are sequential, will be applied in reducing variation and maintaining the required net weight of bar-soaps produced to maintain a competitive edge and for improved customer satisfaction.

STATEMENT OF THE PROBLEM

Nonconforming products and the desire to reduce variation in manufactured goods is a major problem in the manufacturing sector (Patil et al, 2015; Oky et al, 2017). In addition, NAFDAC regulations requires the net weights of products to be declared on the pack. This study is set afoot to deploy the six-sigma DMAIC approach in assessing variation to reduce non-conforming net-weights of bar soaps produced in a local soap manufacturing enterprise. The outcome of this research is intended to answer the following contentious research questions:

1. Is there any variability experienced in net weights which requires improvement?
2. Can further improvements be made by reducing the variability in bar-soap net weight?
3. Will the final stability in net weights improve customer satisfaction and also be in line with NAFDAC regulations?

AIM AND OBJECTIVES OF THE STUDY

Applying six-sigma in assessing variation to reduce non-conforming net-weights of bar soaps in a local soap manufacturing enterprise. Specificaly the syudy objectives is to;

1. Obtain random samples to determine present level of conformance.
2. Analyze the bar soap making process to identify CTQs required for achieving the desired net-weight of products.
3. Deploy the knowledge of these CTQs in producing a fresh batch of bar soaps.
4. Deploy the use of **I-MR** charts, **X bar- S charts** and interval plots to check the level of improvement in net-weight conformance in line.

LITERATURE REVIEW

Product quality is a basic guarantee of a manufacturing company to the customer and an important point in survival. Quality management is an important point for the enterprises management and should be of high concern (Wiklund and Wiklund, 2002; Mu et al., 2013). Defective product is defined as any nonconformity of products output to customer specifications or output that has the potential unfulfilled customer specifications. By reducing defects, the company will strengthen in the competitive advantage. Company will continue to reduce defects as it can increase production cost due to rework and scrap. Many organizations have implemented Six Sigma in reducing or eliminating defects, made quality improvement and cost savings in the manufacturing industry. Six Sigma is a systematic method for process improvement strategy that uses a statistical approach and scientific method in reducing defect rate defined by the customer (Croft et al., 2012). Six Sigma was developed by a Motorola engineer (Bill Smith) in the middle of 1980s. Six Sigma provided results in the business process marked by revival of Motorola and ultimately won Malcom Baldridge National Quality Awards in the 1988 (Snee, 2010).

Six Sigma will continue to be one of initiatives to improve the process in the future. Top management should concentrate on improving the process and not just thinking for calculating disability. In a survey conducted by DynCorp (Mekong Capital Ltd) in 2004, the following results were found: (i) Around 22 percent of US companies implemented Six Sigma, (ii) 38.2 percent of the companies using Six Sigma was in service industry, (iii) 49.3 percent companies using Six Sigma was in manufacturing industry and 12.5 percent were others. (iv) Six Sigma maintained a higher rating than the quality management system and other process improvement tools to achieve maximum results (Zare, 2011).

Six Sigma methodology is accomplished based on two approaches; DMAIC and DMADV. DMAIC (define, measure, analyze, improve and control) is used to make improvement and to reduce defect products (Dambhare et al., 2013; Sonphuak & Rojanarowan, 2013). By using Pareto Chart analysis we can define the highest cause of rejection. In measure phase, the customers' requirement is important, where by Critical to Quality (CTQ) will be

identified to ensure all study meets the customers' requirements. To perform the root cause problem we may use FTA and failure mode and effect analysis (FMEA). Each issue can be defined and measured using statistical method of data collection. Analysis can be performed using a variety of statistical techniques such as Chi-Square, Regression Analysis, ANOVA, etc. Data processing can be performed using Minitab software for various types of projects undertaken. In improvement phase, all output will act according to the result in analysis phase. Improvement section will define the risk and other alternatives are considered to solve the problem. In the final stage, control phase will ensure all results and outputs are continually improved (Kairualazam et al., 2014).

DMAIC is the classic six sigma problem solving process. This approach is to be applied with an existing condition, steady state process or product offering. The variation found from the customer specifications either in a product or process the primary problem and these variations could be in many forms. DMAIC resolves issues of defects, deviations form a target, excess time or cost and the deterioration. DMAIC identifies the key requirement, deliverables, tasks and standard tool for a project team to utilize when tackling a problem. The DMAIC methodology uses a process step structure and steps generally are sequential (Nithyanandam et al., 2014). Six Sigma DMAIC is an approach that refers to the quality improvement strategy. As the backbone of Six Sigma, DMAIC approach provides sustainable defect performance free and long term quality competitiveness (Rao et al., 2015). Sigma is a letter in Greek alphabet which means standard deviations of the expected results. Standard deviation can be defined as the ratio between expected results within a group procedures against the ones which are not succeed. Measurement of standard deviations describe the defect rate or exception that can be calculated (Ketan & Nassir, 2016). Six Sigma combines the intelligence organization and statistical tools for conducting improvements in obtaining more effective and efficient results. Success factors of Six Sigma depends on elements of the models to be implemented. Six Sigma aims to reduce defect rate of production processes, products or services to the level of 3.4 defects per million opportunities (DPMO) (Kumaravadivel et al., 2013).

The main idea of Six Sigma is to design the processes to gain a very high capability process in favor of zero defects (Kwak et al., 2006). Some facts are considered to illustrate why obtained level of 99 percent of quality is no longer enough (McClusky, 2000). First, on mail delivery, reaching the quality of 99 percent means there are 10,000 mails are lost in every hour. Second, landing at airports for the quality of 99 percent means there are two unsafe landed aircrafts in every hour. Third, medical surgical for the quality of 99 percent means there are 500 patients undergoing surgical errors in every week. Fourth, power plant operations for the quality of 99 percent implies seven hours blackout within a month. According to these facts, by considering an obtained quality level for only 99 percent or 1 percent of defect levels on such cases in manufacturing industries can potentially lead to fatalities. Hence, for gaining the target of quality level of 99.9996 percent or free-defects, an organization requires both flexibility and discipline in solving problems using statistical approach rather than using simple intuition or by trial and error (Oky et al.,, 2017). Implementation of Six Sigma's method is more valuable due to its contribution to the science and practice for particularly reduces waste and provides added values. Six Sigma allows users to identify waste, eliminates defects, increases profit margin, satisfies customers, encourages employee commitment and satisfaction as well as expands businesses (Patil et al., 2015).

METHODOLOGY

The Six Sigma DMAIC (define, measure, analyze, improve, and control) quality improvement methodology was used for this study.

Define: In the define phase, we were interested in finding out if the bar-soap net-weights produced are in statistical control and also to confirm the level of compliance of actual produced net-weights in comparison with the declared net-weight of **70grams** of the product.

Measure: 30 bar-soaps were randomly selected and weighed for investigation to see if their weights are under statistical control and to also see if the weights are in line with the declared net-weights. For the 30 units of bar-soaps, the control chart for individual units is applicable.

$$MR_i = \left| x_i - x_{x-1} \right| \quad (3.1)$$

And the control charts for individual measurements;

$$UCL = \bar{x} + 3\frac{\overline{MR}}{d_2}$$

Center line = $\bar{x}$ (3.2)

$$LCL = \bar{x} - 3\frac{\overline{MR}}{d_2}$$

Analyze: The bar soap manufacturing process will be analyzed with the aid of a fishbone diagram also known as a failure mode effect and analysis to

identify the Critical to Quality factors to enable us improve the production process.

Improve: The goal of the improve stage is to find and implement solutions that will eliminate the problem of inconsistent and underweight bar-soap net weight, reduce variation in the product, or prevent a problem from recurring.

Control: To ensure the process remains under control, the observed mean and standard deviation of the improved process were used to run a simulation to generate control charts to use in monitoring the production process to help maintain control over the production process. Whenever the bar-soap net weight goes outside the control limits, the CTQs must be investigated to try to bring it back into control.

A Digital Electronic laboratory weighing balance **5000g/0.1g** was used in weighing the various samples to obtain data for study, and Minitab software 20 was used in carry out all the analysis including the generation of graphs and charts to facilitate the study. At the measurement and improvement stage, the digital electronic weighing balance was used to collect data by weighing 30 samples randomly selected for analysis. In Figure 3.1 an underweight bar of soap weighing 66.2grams is revealed while in Figure 3.2 after improvement, we have a sample weighing 71.5grams.

Figure 3.1 An underweight bar-soap weighing 66.2grams

Figure 3.3 An improved bar-soap weighing 71.5grams

In bar- soap making, the steps are classified into seven main steps:

1. Getting the right mixture of oil/fat and alkali, called “proving”,
2. “Boiling down” – removing the unwanted water, and checking for “doneness”,
3. Treating with salt to remove water, impurities, and glycerin a process called ‘graining’ this step makes a good solid soap for washing clothes,
4. Adding colouring agents (colourants) and perfumes,
5. Pouring into moulds, called “setting”,
6. Breaking the soap out of the mould and smoothing it into finished sizes and finally,
7. Drying and airing the bar-soap.

The MINITAB20 Software was deployed to test the normal distribution of the data, develop charts to confirm if the data is under statistical control and finally develop quality control charts to maintain production of goods at optimal level.

RESULTS AND DISCUSSION

Define Phase: For customer satisfaction and to conform with NAFDAC regulations with regard to the net weight of products declared on the pack, it was necessary to investigate the net weights of already bar soap to investigate if it requires improvement.

Measurement: In this stage, 30 samples of already produced bar-soaps were randomly sampled and weighed and the data is presented in Table 4.1.

Table 4.1: Bar-Soap Samples before improvement (grams)

65.1	**72.1**	**68.3**	**67.5**	**67.3**	**67.2**
66.4	69.5	67.2	68.4	67.0	67.4
67.5	66.7	69.4	66.3	68.0	66.2
66.2	69.1	68.5	68.3	69.0	66.0
68.2	67.3	69.3	68.5	68.4	70.2

We need to investigate the data to see if it is in statistical control. Each number represents a single bar-soap hence we adopt the I-MR (Individual and moving range charts). In figure 4.1, the test result for moving range (MR) shows that one point more than 3.00 standard deviations from center line failed at point 2. It is also necessary to investigate if the data is normally distributed before constructing a 95% confidence interval for the mean of the bar-soap net weights. The graphical summary in figure 4.2 shows a p-value 0.549 of the Anderson-

Darling normality test, which is greater than 0.05, hence the data is normally distributed. It is also observed that the population mean is between 67.3 and 68.4grams. The entire confidence interval is seen to be less than the desired net weight of 70grams which indicates that the net weight of the bar soaps produced requires improvement.

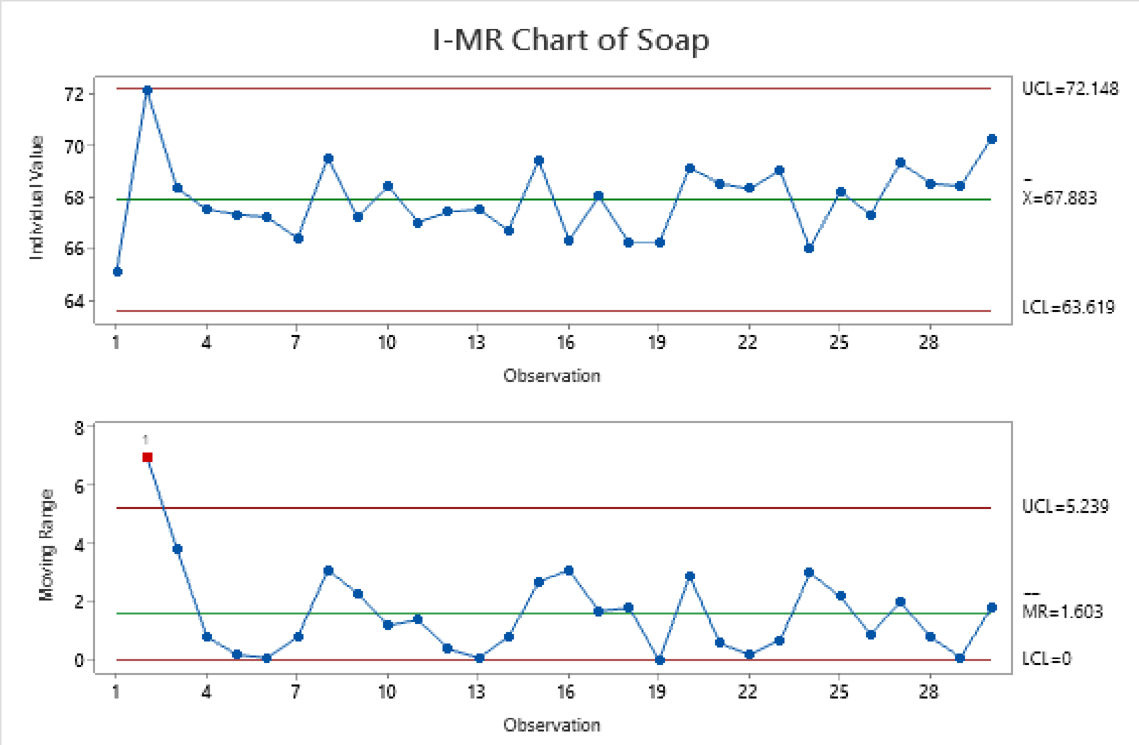

Figure 4.1 Individual and Moving range chart before improvement.

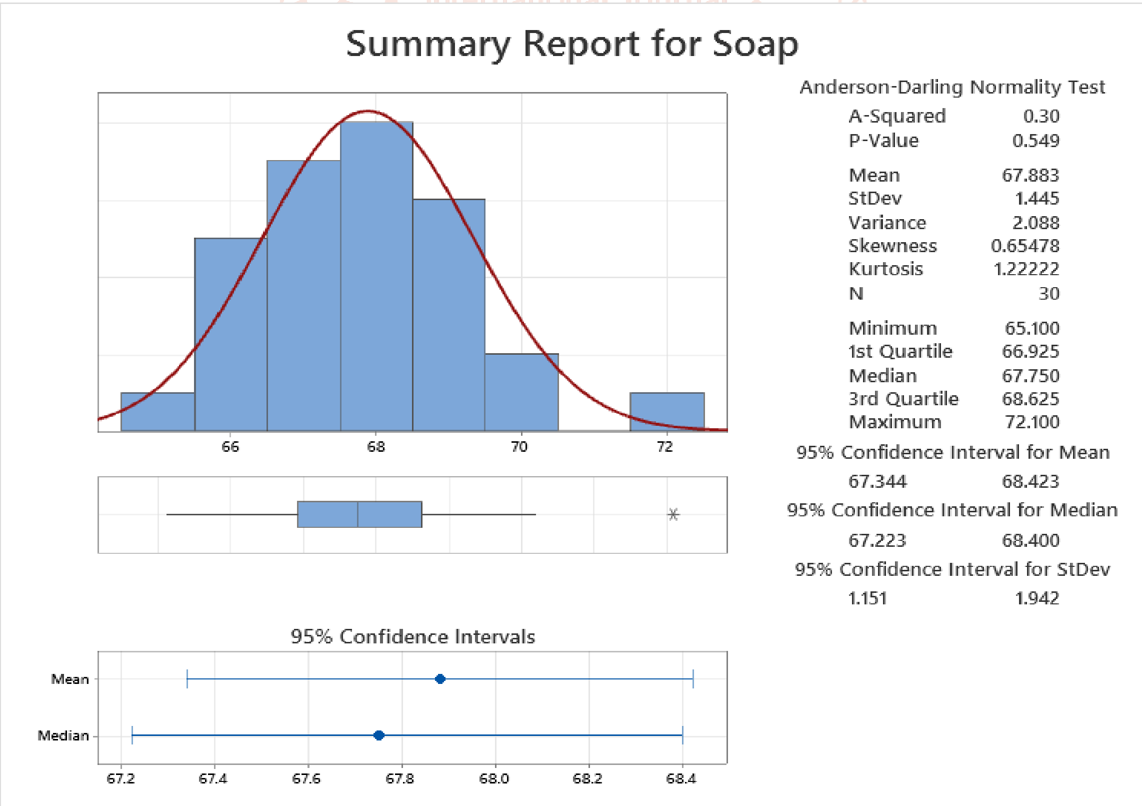

Figure 4.2 Graphical summary before improvement.

Analyze

In the analyze phase, we had to take a look at the entire manufacturing process from the soap molds, the measurement in proportion of the soap mix, raw materials as well as the drying/curing process which are important CTQs for improved consistency and stability on the finished product. After the drying/curing process, the density of the bar soap was investigated relative to its mass and density to determine the right mold capacity. Also, the ideal pouring temperature of the soap trace into molds is 140°F (60°C) for a properly filling out of the

molds which is crucial to having the right shape and making the desired net weight as required. In Figure 4.3, the Ishikawa fishbone diagram guiding the analysis phase is revealed.

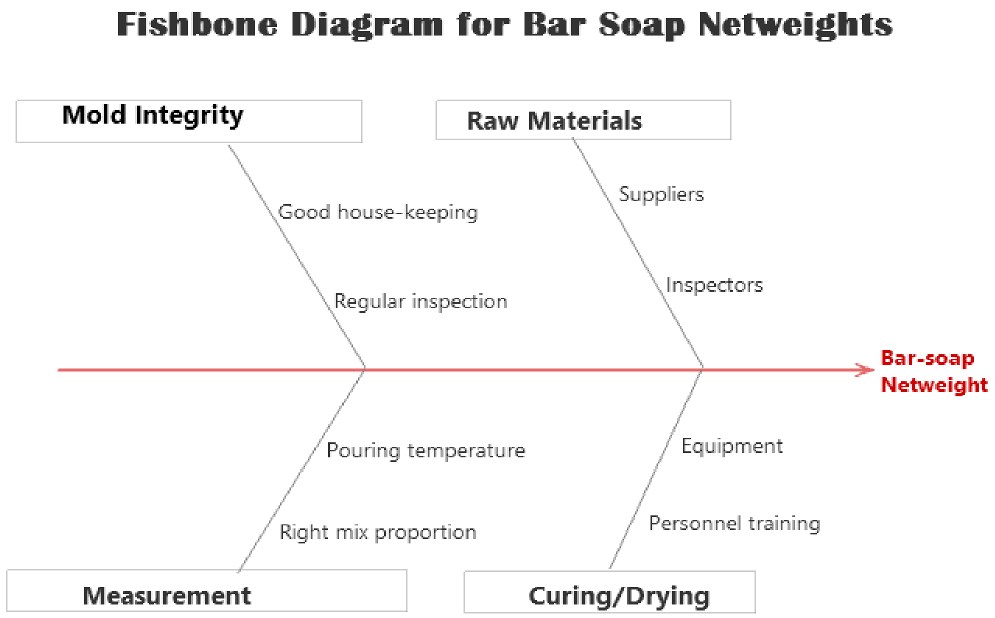

Figure 4.3 Fishbone diagram of bar-soap net weight CTQs

Improvement

After investigating the production process, it was decided that the bar-soap molds be audited and those requiring replacement be replaced. The mixture proportion well mixed to obtain a uniform mix. All necessary CTQs were factored into the improvement process. These were done before the production process recommenced. Two weeks after production recommenced, 30 bar-soap samples were randomly selected and weighed as done at the measurement stage to check if there is an improvement on the net-weight of bar-soaps produced. The net weight of the bar-soaps is presented in Table 4.2.

Table 4.2 Bar-Soap Samples after improvement (grams)

70.1	71.4	70.7	72.3	71.8	73.2
72.2	71.9	71.2	72.4	71.8	72.4
71.3	71.5	70.2	71.7	71.4	72.2
70.8	72.8	72.2	71.3	72.1	71.9
71.9	71.2	71.8	70.9	72.7	70.2

Before constructing a confidence interval for the data in Table 4.2, it is important we investigate if the data is in statistical control. Inputting the data into Minitab20, and generating the I-MR chart, it is observed that the data is in statistical control as shown in Figure 4.4.

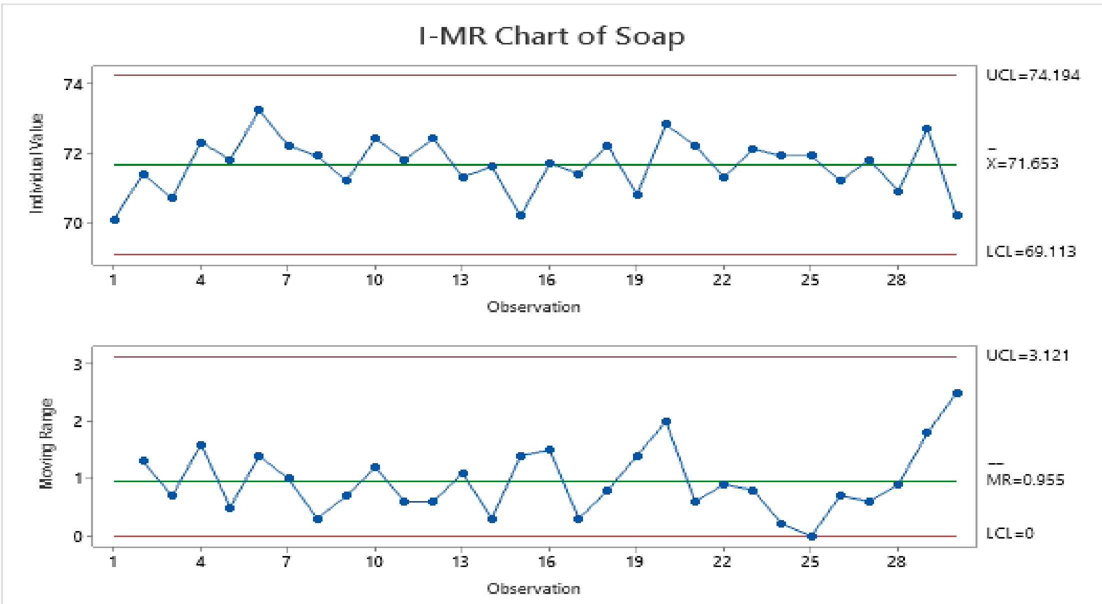

Figure 4.4 I-MR chart after improvement

It is also crucial we check if the data is normally distributed which we confirm from the graphical summary displayed in Figure 4.5. With a p-value of 0.564 which is greater than 0.05, shows that the data is normally distributed. The population mean is observed to be between 71.4 and 71.9grams.in as much as the declared net weight of 70grams is slightly below the interval (71.4, 71.9), then it is obvious that the process has improved as the mean bar-soap net weights is no longer below the declared net-weight of the product.

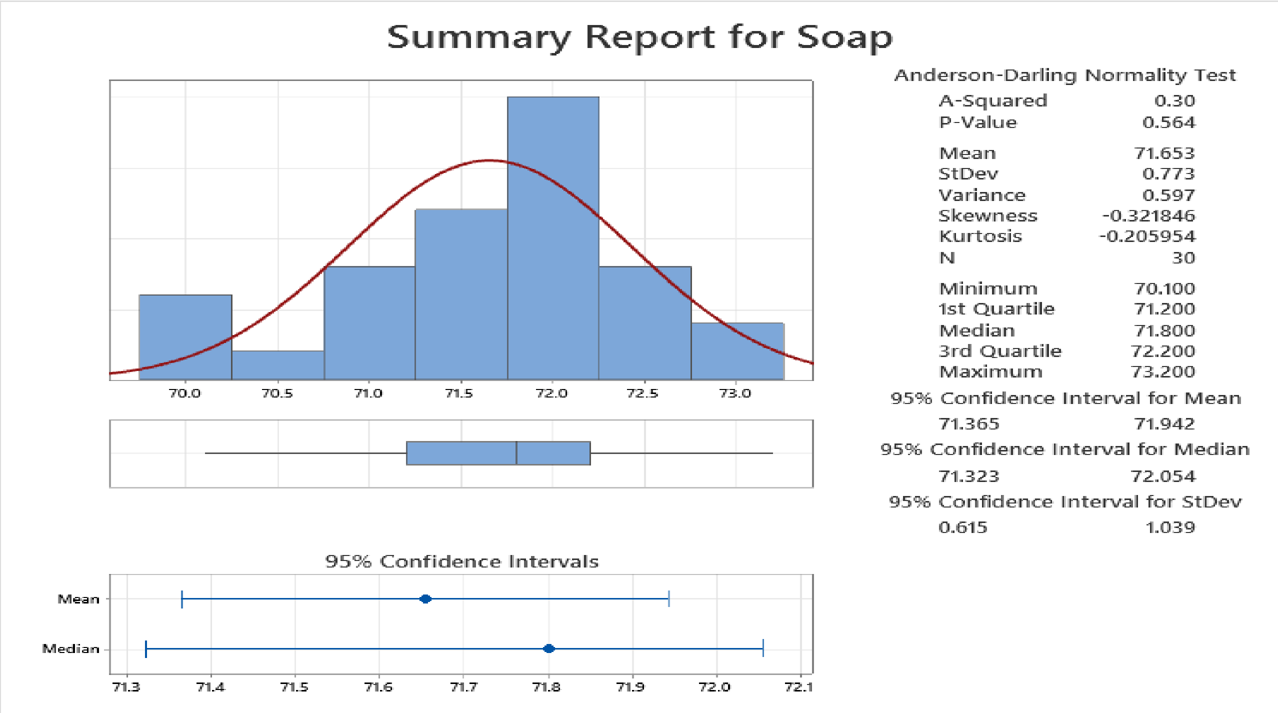

Figure 4.5 Graphical summary after improvement

Taking a look at the comparisons on the before and after diagnostic report in Figure 4.6, the data before and after improvement, passed the normality test with p-values of 0.549 and 0.564 respectively while the I-MR charts show that there is an improvement in statistical control and a reduction in variability after the improvement on the bar-soap manufacturing process. On the capability histogram in Figure 4.7, there is a shift closer to the net weight target of the mean distribution after improvement. There is also a reduction in the actual (overall) defective parts per million opportunities (DPMO) from 933,333 to 0 which is an improvement from a 2/3 Sigma level to a 6 Sigma level after improvement which must be maintained.

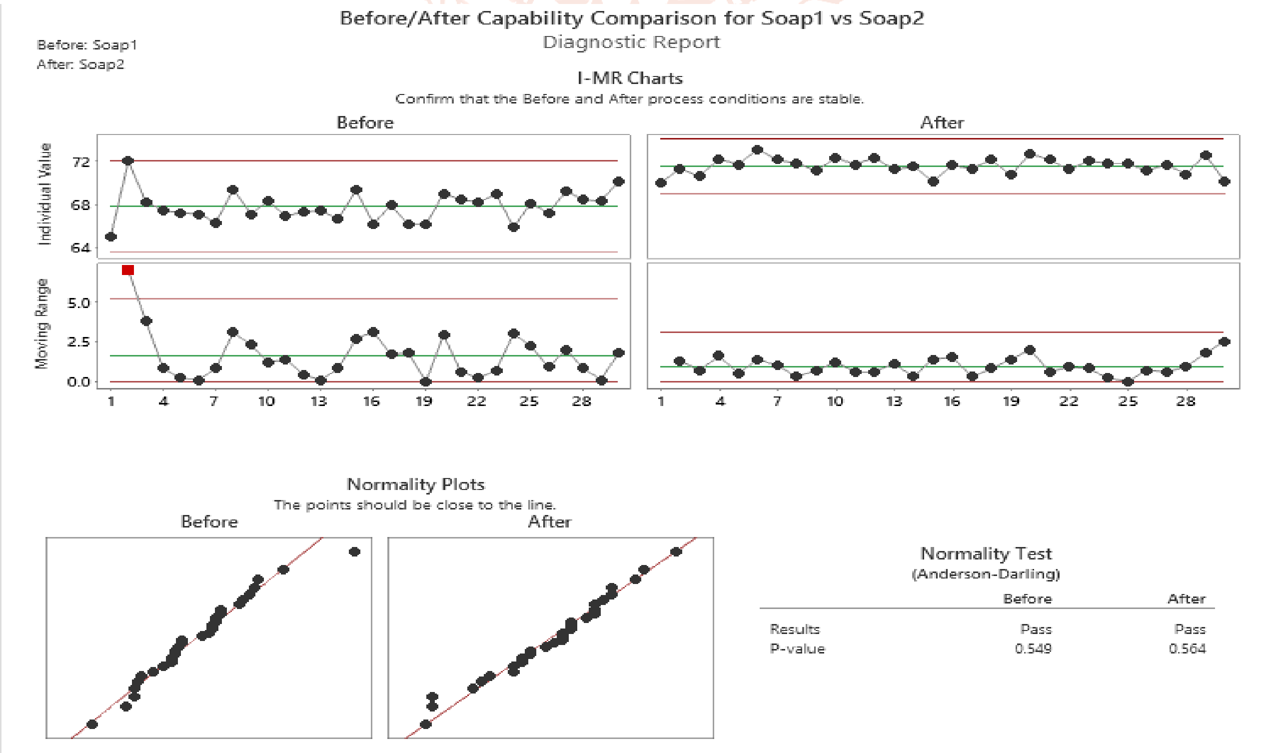

Figure 4.6 Before/After diagnostic report

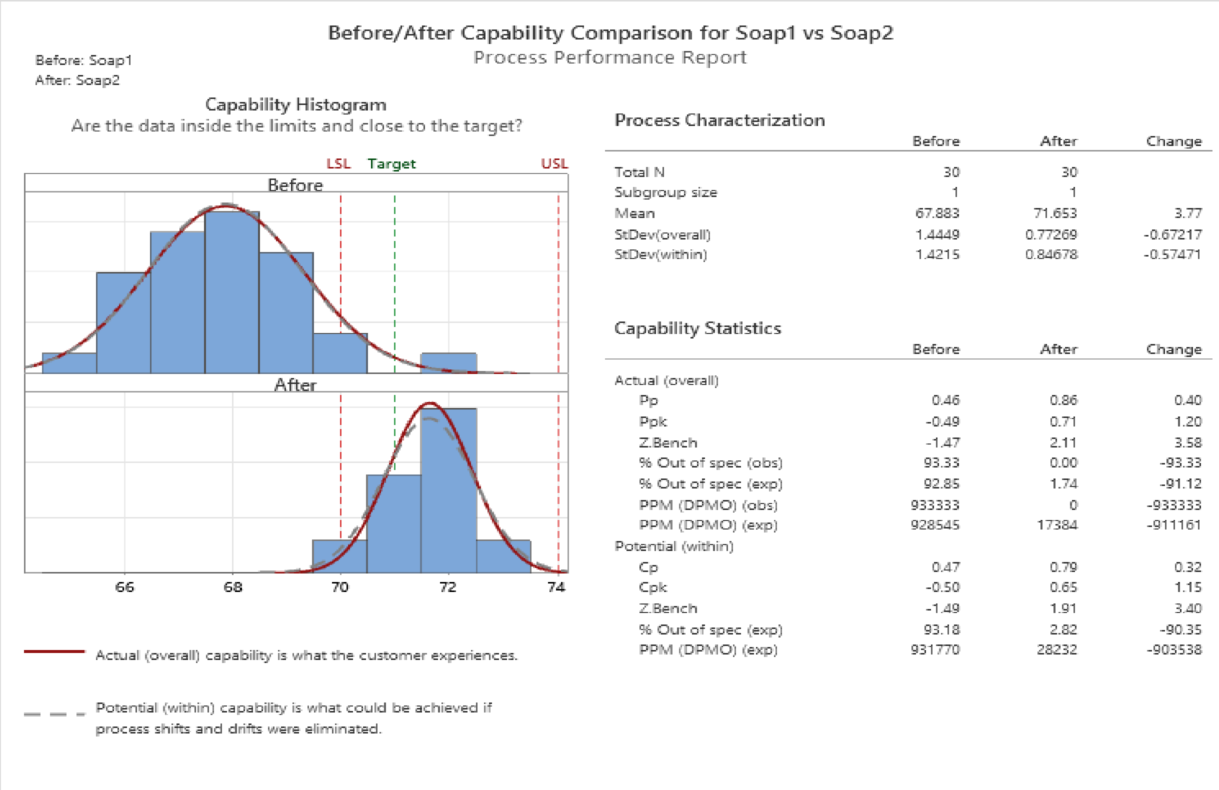

Figure 4.7 Before/After process performance report.

Control:

From the graphical summary after improvement, the population mean is approximately 71grams and the standard deviation 0.7 grams. This can be used to run a simulation on Minitab. Simulating confidence intervals using, we perform the simulation for 10 normally distributed samples with a sample size of 30 bar-soaps and this generates the data shown in Figure 4.8.

↓	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11
	Soap										
1	70.1	71.7341	69.4678	70.4238	70.1717	71.2123	69.6735	70.5727	71.0370	70.9005	69.1247
2	71.4	70.6777	71.1322	70.5334	71.7885	70.6086	72.4960	71.4159	71.3055	72.3979	70.4052
3	70.7	71.1520	69.6776	70.7108	71.0957	70.3567	71.4485	69.6433	71.0943	70.7808	70.7217
4	72.3	71.4689	71.2608	69.7447	70.8499	69.9497	70.7208	70.3582	71.4947	71.7027	70.9554
5	71.8	70.7970	70.3374	71.9187	71.1278	71.0378	71.1788	71.4711	69.7025	72.2107	70.3932
6	73.2	70.2433	71.0191	70.0676	70.1438	70.7884	70.3313	71.6236	70.4662	71.7358	71.5484
7	72.2	70.6420	72.1179	71.2489	69.9931	71.4913	71.0403	71.2577	69.7874	70.8795	71.3136
8	71.9	71.2903	71.5283	70.5448	70.9358	71.8662	71.6490	69.6980	71.8506	71.0613	70.9535
9	71.2	69.8479	71.5706	70.3757	70.6839	71.9826	71.6337	71.1258	70.8400	70.7805	69.8885
10	72.4	70.5370	70.5765	70.8927	71.4367	70.8273	72.2218	70.8213	71.1037	70.0088	70.2195
11	71.8	71.1865	70.8955	71.4045	70.1723	71.9611	72.0765	70.1482	69.6430	71.6632	70.7684
12	72.4	70.9494	70.2900	70.6045	71.8728	70.8973	72.1290	70.8072	71.8238	69.7039	71.9009
13	71.3	70.8533	70.3840	70.4862	70.2990	70.9854	71.9310	71.7943	70.6564	71.4134	69.6075
14	71.6	71.1621	70.3476	70.8196	70.6034	70.8721	71.3407	71.3939	69.7777	70.6958	72.1869
15	70.2	71.5434	72.6165	72.3067	70.8845	71.2597	71.0885	71.7038	70.2624	69.5435	71.9695
16	71.7	70.7632	70.3976	71.3520	71.6526	70.8594	71.2521	71.8724	71.4105	71.6666	69.6310
17	71.4	72.2594	71.5072	72.0340	72.4569	71.4895	70.3014	70.8112	71.9488	71.3627	71.3222
18	72.2	72.3868	71.0781	69.9994	71.3637	70.4912	72.1495	69.9458	70.8767	70.1801	71.7317
19	70.8	70.8610	70.8023	71.1871	70.3035	71.3294	71.0761	70.8529	70.8956	70.1281	70.7450
20	72.8	71.2100	70.2423	69.5772	71.5890	71.8053	70.8262	71.0203	70.7013	71.8258	70.5242
21	72.2	71.0629	71.3067	70.6705	71.2328	71.0516	70.8035	70.0901	72.1512	70.7186	71.5377
22	71.3	71.3845	71.0651	70.6617	71.0977	71.3672	69.8342	72.2622	69.7427	71.0359	71.6044
23	72.1	71.1528	70.7608	69.4556	71.4816	70.5006	71.3290	69.9913	70.2868	71.0180	71.3521
24	71.9	72.3897	70.3093	70.7861	70.5201	71.8353	72.0651	71.2828	71.1479	70.1532	71.0526
25	71.9	71.6960	71.5958	71.4378	71.6278	70.5145	71.3096	70.1705	71.4535	71.8548	70.9879
26	71.2	72.1067	70.5043	69.9007	70.6221	72.3274	70.6561	70.9117	70.7729	71.6829	71.3033
27	71.8	69.7619	71.1128	72.2084	70.7631	71.1909	71.7706	69.7807	71.2719	71.1181	70.3009
28	70.9	71.0716	70.3175	70.4965	70.9681	70.6425	70.5909	70.7999	70.4220	70.8685	70.8110
29	72.7	71.0458	70.9600	71.0086	70.4642	71.2942	70.2951	70.5563	70.4713	69.5763	70.6709
30	70.2	71.1986	70.5037	72.6343	71.5499	71.1840	70.2009	71.3461	71.1004	71.7031	70.7741

Figure 4.8 Original data with ten random samples with sample size of 30.

For simulating the confidence intervals for the 10 samples generated, the interval plot (95% confidence intervals) for the 10 samples is shown in Figure 4.9. It is observed that most of the confidence intervals contain the population mean of 71grams. This simulation confirms that the population mean is indeed 71 grams, showing that if the simulation is performed for a large number of samples, 95% of the confidence intervals are expected to contain the population mean of 71grams in the interest of the Voice of the Customer (VOC).

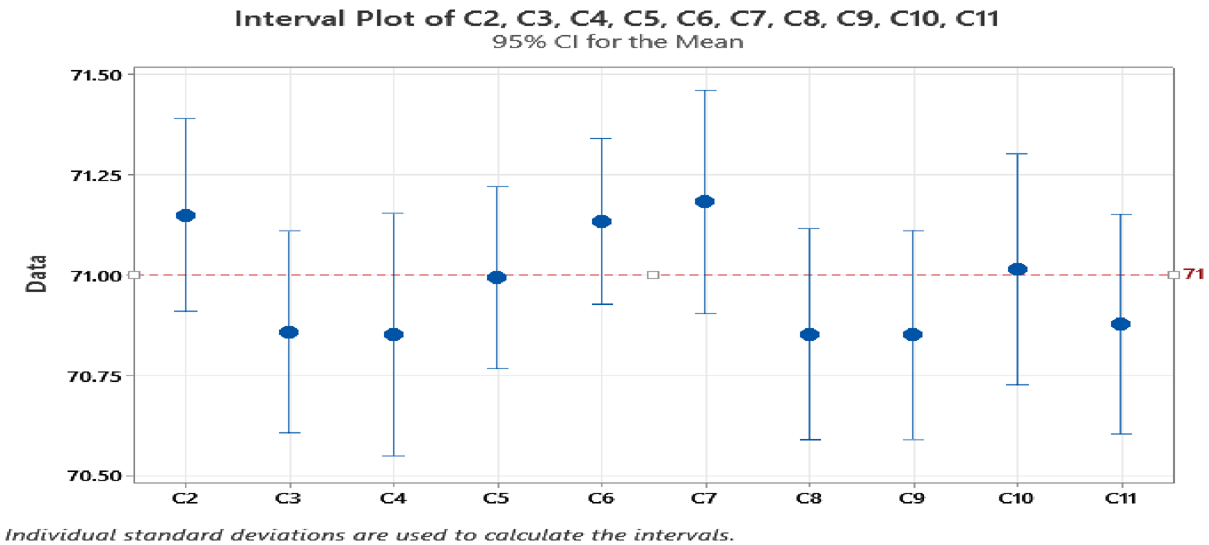

Figure 4.9 Interval plot for the 10 samples generated.

To confirm if the data is in statistical control, the appropriate chart to deploy is the X bar-S chart (sample mean and sample standard deviation) since the sample size is greater than 10. The chart is revealed in Figure 4.10 showing the simulated data is in statistical control. This also shows the stability in the production process of the bar-soaps and all CTQs should be closely monitored for sustained control of the bar-soap net weights.

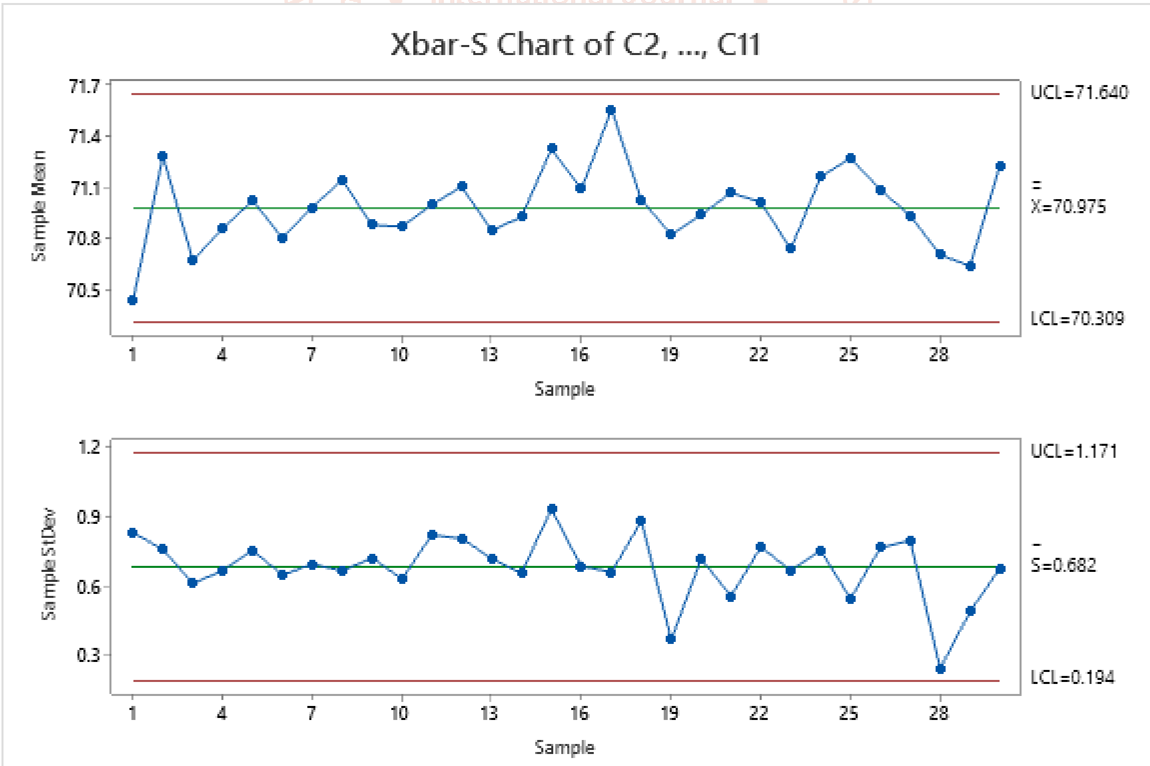

Figure 4.10 X bar–S chart for simulated data.

Discussion

This was the first time the case company has deployed an improvement project systematically to improve the consistency in net weight of bar-soaps produced. This is due to a lack of experience and capability by the employees. It is common knowledge that customers enjoy having value for their money and when they notice a product manufactured is consistently underweight, it may cause them to begin a boycott of such products in the market, hence it was of great value to conduct this study to maintain a consistent net weight of bar-soap just at, or a little above the declared net weight of the product. This is in line with the Voice of the Customer (VOC), which

is also as required by NAFDAC regulations in the interest of the customers.

The Six Sigma DMAIC methodology deployed helped to address the research questions set out at the outset as captured in the problem statement.

1. The population mean of the bar-soap net weights was discovered to be within 67.3 and 68.4grams which is below the declared net weight of the product. And this requires improvement in the interest of the customers and to remain competitive in the market.
2. After scrutinizing the production process, certain Critical To Quality Characteristics (CTQs) were identified and improved upon and when deployed in the production process, improved the bar-soap net weights population mean to 71.4 and 71.9grams which is indeed an improved condition.
3. To check the final stability of the improved and prevailing net weights, the mean and standard deviation of the improved process was used to run a simulation study and the X-bar – S chart proved that if present conditions are maintained, the manufacturing process will churn out consistent bar-soap net weights of 70+ grams which will leave customers satisfied and also meet the regulatory requirement of NAFDAC.

CONCLUSION

The markets are becoming global & economic conditions are changing fast. Customers are very quality conscious & demand for high quality product at competitive prices with product variety and reduced lead-time. Companies are facing tough challenges to respond to the needs of customers while keeping manufacturing & other related costs down .The companies are striving for their very survival. Companies can cut down their costs by reducing the production of defective parts. This is what Six Sigma is all about. Six Sigma is disciplined, focused and scientific problem solving technique, which uses statistical and non statistical tools integrated with methodology to bring down number of defects to 0/ 3.4 defects per million opportunities in any process. Six Sigma is a quality management program to achieve "Six Sigma" levels of quality, which this study has demonstrated in reducing defective net weights of bar soaps produced in a small business enterprise. The application and use of Confidence intervals to improve a given quality characteristic in a product or any product has been demonstrated in this study and it is recommended to other businesses and researchers to deploy in improving their goods and services, to a satisfy the ever improving and competitive market experienced in present times.

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